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Environmental Conditions of Three Representative Villages in Thailand(<Special Issue>The Natural Environment and the Socio-Economic Behavior of Farmers in Thailand and Java : A Preliminary Summary Report on "Nature and Man Project" of Kyoto University Center for Southeast Asian Studies)

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II. Environmental Conditions of Three Representative Villages in Thailand

by

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1. Physical Framework of the Deltaic Region

The physical framework of the Chao Phraya's deltaic region is demonstrated by three maps, showing the physiographic structure (Fig. 1), soil condition (Fig. 2) and hydrographic environment (Fig. 3). If a slight discrepancy is neglected, the three maps correspond to each other quite well, and what the maps reveal is that the deltaic region is categorized into at least four different areas. They are:

A: Fan Terrace Complex—Older Soil—Marginal Zone

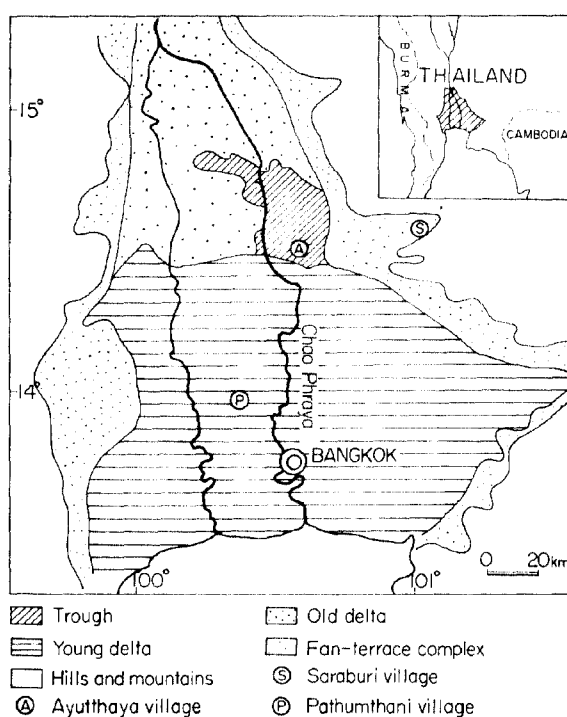


Fig. 1 The physiographic map of the deltaic area of the Chao Phraya

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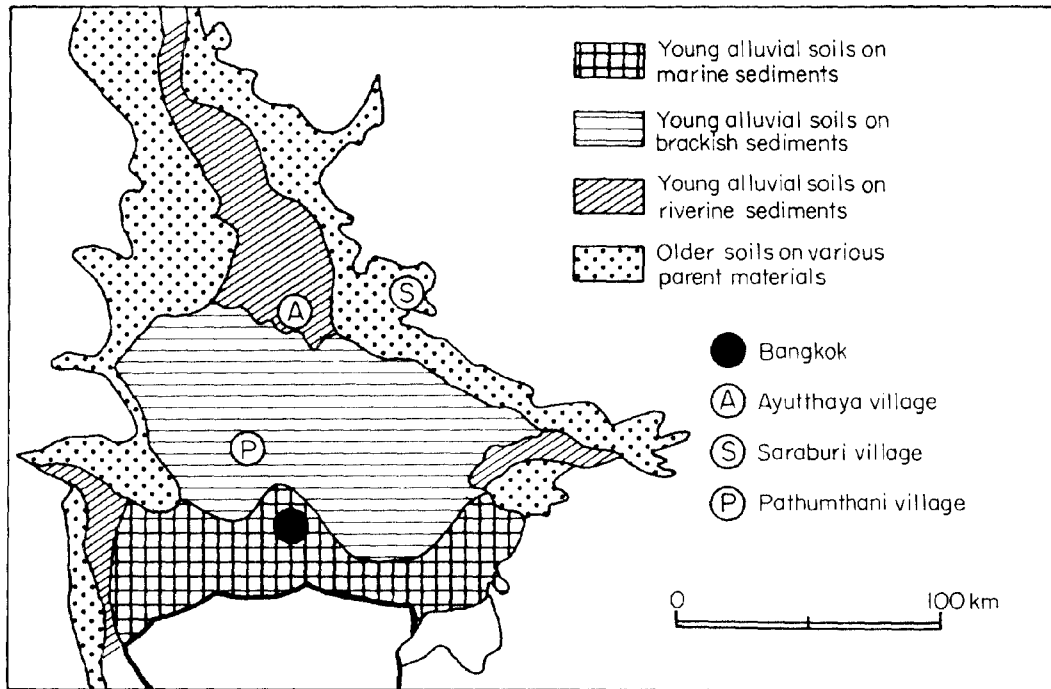


Fig. 2 Map showing the soil conditions of rice land in the Chao Phraya River Basin (Cited from "A Simplified General Soil Map of Thailand 1:2,500,000" by F. R. Moormann and S. Rojanasoonthon, with slight modifications)

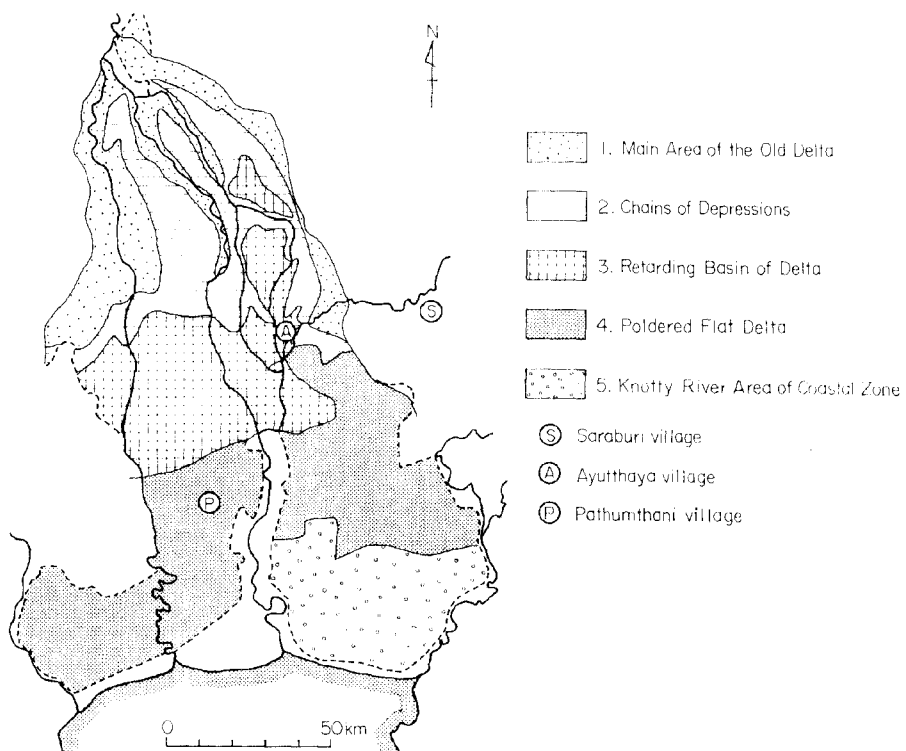


Fig. 3 Hydrographical subregions of the Chao Phraya Delta

- B: Old Delta—Older soil—Main Area of Old Delta including Chains of Depressions
- C: Trough—Young Alluvial Soils on Riverine Sediments—Retarding Basin of Delta
- D: Young Delta—Young Alluvial Soils on Brackish and Marine Sediments—Poldered Flat Delta

Area A is characterized by the terrain of gentle slopes and small relief with poor soils. Sources of water are unreliable as the rivers are short, and the river basins are relatively small. Hence, rice-growing is subject to frequent damage due to drought. In short, this area is represented by the water-deficient foothills.¹⁾

Area B is also an area of a small relief, and the ground surface is covered by poor soils. The inclination of the area is not uniform, as there is a vast stretch of horizontal land also. The water regime is very different from that of Area A. This area is subdivided into two areas with respect to water conditions. One is the main area of the Old Delta where the water regime is favorable for rice cultivation, since the gravitational irrigation with canal networks is possible and fairly effective. The other is the area of the so-called chains of depressions, composed of (a) narrow strips of backswamps sandwiched between levees, (b) terrain of rises and depressions between the major tributaries, and (c) marginal zones of the Trough. In short, the latter area is a “dumping place” for water from the former surrounding area. The water regime in the latter area is characterized by a rapid rise of the water table shortly after a heavy rainfall in the Old Delta.²⁾ Predominance of broadcast rice reflects the unstable water conditions.

Area C may be described as a vast swaley zone with a floor of rather large relief. Soil is heavy and rich. Toward the end of the rainy season, a large quantity of water drained from the chains of depressions rushes into this swaley area, causing the abrupt rise of the water table. This area is the retarding basin for the entire delta.²⁾ The maximum water depth is in the range of 60~120 cm, with certain spots where it exceeds 200 cm. Growing of tall, broadcast rice, typically, floating rice, is the only feasible way of adapting to this water condition.

Area D is characterized by flat and low terrain of typical delta topography. Soil is predominantly clayey and rich. The rate of the rise of the water table in the high-water season is rather low, though the water depth usually increases up to 60 cm. General water condition is more controllable as compared with Areas B and C, by constructing large-scale polders and canal systems. This is proven by the fact that the whole area of D has been developed by the poldering system with magnificent man-made canals and their banks for a three-fold purpose; first, serving as a means of waterway communication, second, serving as a means of flood control, irrigation and drainage, and third, providing houselots on the elongated banks.³⁾

2. Sketch of Three Villages Surveyed

Three villages surveyed are plotted on Figs. 1 to 3. Saraburi village is located in Area

A, Ayutthaya village in Area C and Pathum Thani village in Area D. Climatologically speaking, these three villages are alike. Annual precipitation is ca. 1,200 mm, with 4 humid months starting in August and lasting to November.⁴⁾ Though the region has a 4-month humid period, the amount of rainfall during the period is inadequate to supply water for rice growing. In this sense, rain-fed rice cultivation, which relies solely on rainfall, is impossible. Rice growing, therefore, must be done depending on water supplemented from other sources like river water, natural inundation, or artificial ponds. This is the common situation of the main part of Indochina and Thailand, which is climatologically defined as Group V climatic region by Kyuma.⁵⁾

Land and water conditions of each village are briefly described in the following paragraphs.

(i) Saraburi village

The village stands on gently sloping terrain which extends from the foot of hills (ca. 200 m) on the south and inclines northwestward down to the Pasak river (Fig. 4). The ground is nearly everywhere sandy and composed of what soil scientists call Hin Kong series, one of the poorest soils in Southeast Asia.⁶⁾ In places, even laterite occurs very close to the ground surface.⁷⁾ This honeycomb-structured hard pan is one of the most serious obstacles to agriculture. *Dipterocarps* trees and brushes are the only vegetation growing on laterite, and even these resistant plants cannot be recovered sufficiently once they are destroyed. The land surface is thus very poor both in inherent fertility and in dynamic stability.

The hydrographic condition is again unfavorable for agriculture. Streams are all short, averaging 4 km from the headwaters to the village, thus tend to be intermittent in flow, with

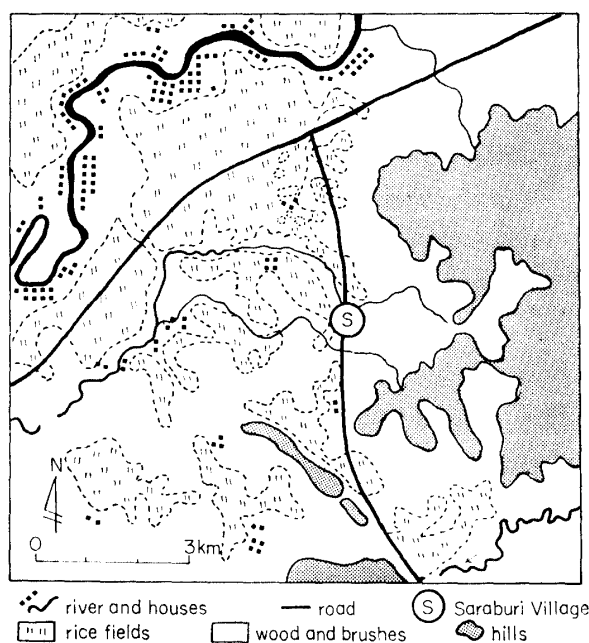


Fig. 4 Map showing Saraburi village and its environs. Rice lands are fragmented, showing mosaic patterns with wood-and-brush lands.

gushing water only during the rainy season. Furthermore, the streams are sparsely distributed. All these stream conditions are absolutely disadvantageous for agricultural use. To cope with this adversity, people build many small dams made of earth and brush on streams, which they call "tham nop", in order to reserve and raise the water level so that they may draw water to rice fields. In spite of these efforts, all streams are not very helpful. A rough estimate shows that rice fields dependent on streams, either natural or dammed up, are 20 to 30% of the total rice acreage in normal year. Another device of getting water is farm ponds which are dug where river water is not available. Shallow ground water is exploited in this way. Farm-pond irrigated fields seem to occupy approximately 10% of the total rice land. The rest of the fields which receive water neither from stream nor pond are naturally non-irrigated, although the rice cultivation there is not rain-fed in a strict sense. Thus, the village and its vicinity are in an absolutely water-deficient area for stable rice growing. It is quite common that a sizable acreage of fields remains idle every year due to the lack of water.

Scenically speaking, the rice fields, especially those in the near-hill area, give the impression of a newly-reclaimed land. Numerous trees and bush clumps associated with termite mounds stand not only on the bunds but within rice fields. This gives the impression of new-clearing. Because of the relief of the ground surface, rice fields are parcelled into small pieces of irregular shape, and they are bounded by high bunds, often as high as 0.7 m or more, in order to pool water. During the dry season, these bunds, which are mostly made of sandy materials, are often seen to collapse due to the lack of cohesion, and thin veneers of sand spread out into nearby fields. This also gives a somewhat desolate and unestablished atmosphere to the area.

Although unfavorable in terms of agricultural productivity, the village and its vicinity are suitable for residential use. At least, the area does not suffer from prolonged inundation which is a common demerit in the deltaic region. Wells several meters deep yield clear water throughout the year if lucky. This is a kind of unlooked-for advantage in the deltaic region. As long as the population density remains low, general circumstances of the area would allow favorable conditions for living.

(ii) Ayutthaya village

The village and its environs consist of three topographic units; river course, natural levee and backswamp (Fig. 5). The main river course is the Pasak along which the village is situated. The Pasak is approximately 100 m wide and carries ample water during the wet season, but the water level lowers by 3 to 4 m in the dry season, exposing steep banks on both sides. This type of large river course is utilized as the main transportation route throughout the year (Fig. 6-A). Levees are elevated zones along river courses having the width of 200 to 500 m. Since levees are not submerged even during the wet season, except for a brief period of extraordinary high flood, this is an ideal place both for human beings and most plants to live on. In most places levees are covered by giant canopies of rain tree

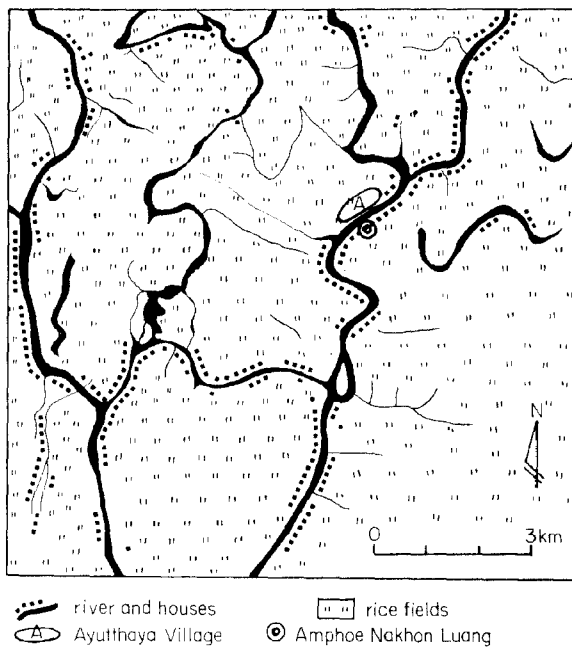


Fig. 5 Map showing Ayutthaya village and its environs. Big rivers are ubiquitous, holding back swamps in between.

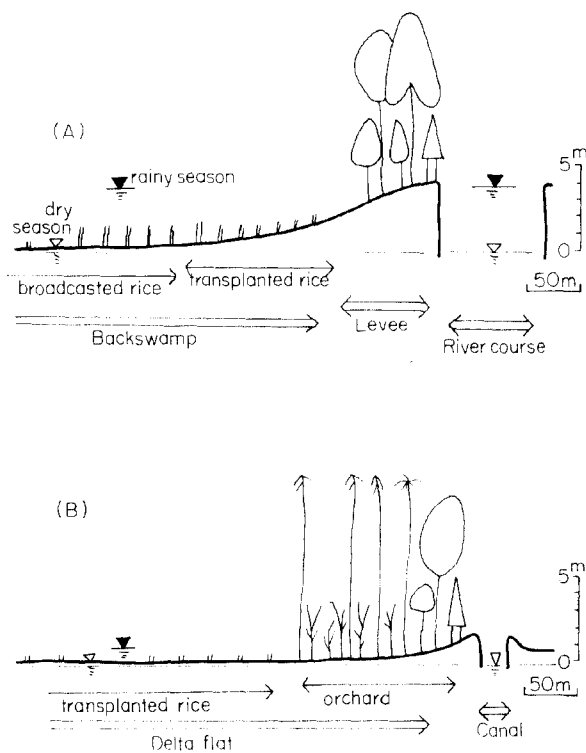


Fig. 6 The cross-sections through Ayutthaya village (A) and Pathum Thani village (B). Both are drawn on the same reduced scale.

(*Enterolobium Saman*) and makaam tree (*Tamarindus Indica*) and many other garden trees of various kinds and sizes. Backswamp, on the other hand, is a swale behind a levee, and is 1 to 4 m lower than the adjoining levee. Soil is, without exception, composed of heavy clay. Deep inundation is inevitable during the rainy season.

Hydrographically speaking, backswamps during the rainy season are characteristic. Floods flowing into the Pasak and the Lopburi rivers over-flow the banks near the village caused by the dam-up effect at the confluence to the Chao Phraya. Floods fill the backswamp very rapidly in September and stay there for several weeks being blocked by natural levees. The force of floods is so mighty that it is entirely impossible for local people to regulate it with their level of technology. This is why local people grow flood-resistant variety of rice, such as floating rice, in the backswamps. Marginal zones of levee which average 100 to 500 m wide are, however, high enough to escape from flood damages. Thus, these zones become ordinary transplanted paddy fields. A lateral irrigation canal, which is a branch of the Chainat-Pasak main canal, runs along the marginal zones. Its function is primarily to "supplement the natural inundation from the Pasak", though it is often a help to the irrigated transplanted fields.

As outlined above, the natural environment of this area is so rough and wild that people cannot modify the given setting, at least with the communal manpower. The only way to survive on this terrain is, therefore, to adapt oneself to the environment. No paddy fields are found on levees and no house is in a backswamp. The environmental conditions of the area definitely controls the pattern of life in this terrain.

(iii) Pathum Thani village

This village is situated in the central part of the Young Delta. The Young Delta is a very low and flat terrain, and the local relief caused by deltaic creeks seldom exceeds half a meter. Soil fertility is high, nearly at the same level as that of the backswamps of Ayutthaya village.⁶⁾

One characteristic feature of the Young Delta is man's interference in the original environments. The bulk of the delta surface is covered by a dense canal network so that it can be called "canalled low land" (Fig. 7).¹⁾ The undisturbed status of the Young Delta under monsoon climate has a kind of amphibious nature. Because of its flatness and low elevation, the entire region shifts from one extreme to another corresponding to the climatic fluctuations, such as total submergence under water during the wet season to total parching of land during the dry season. This circumstance rejects human inhabitation. Man-made canals, however, change this situation definitely. Canals, of course, provide waterways and are utilized as perennial passage for boats, while the earth dredged from the canal bottom and piled up on banks high enough to keep their surface above the rainy season's water level, would serve as housing sites. Once transportation and housing are secured, the area readily becomes the domain of human activities. In the Chao Phraya's delta, systematic canalization was carried out by excavating geometrically delineated new canals. Some

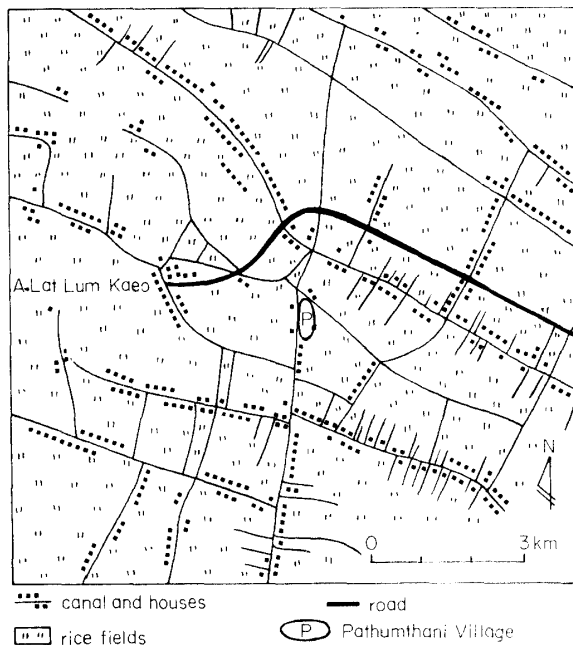


Fig. 7 Map showing Pathum Thani village and its environs. Flat land lacking large river courses is minutely ramified by canals.

natural creeks were also canalized by straightening and clearing, as exemplified by the Phra Udom Song canal, one of the main canals in the Young Delta and along which the village of Pathum Thani stretches.

A cross-section cutting through Pathum Thani village is illustrated in Fig. 6-B. The bank of the canal is wide and high enough to support houses and orchards 100 to 200 m wide, behind which extend beautiful rice fields. What must be noticed here, however, is that this cross-section gives a somewhat misleading image of the typical landscape of the Young Delta. The bank on which the village stands is very magnificent compared with average ones. A standard cross-section of a village along a canal in the Young Delta is such that the canal is 5 to 10 m wide and the bank is only 5 to 20 m wide, with very meagre or almost no orchards. The grandiose bank of Pathum Thani village is due to the original swell of the natural levee of what is now called Phra Udom Song canal.

Rice growing season in the village is from April through August, so they grow the so-called early season rice. A shift of growing season, from the main season cultivation to early season, and even to double cropping of rice in certain acreages, has taken place since the early 1960's. New higher yielding rice varieties like RD variety are extensively disseminated for the early season growing. Some commercial fertilizers and insecticides are also used. This seasonal shift is a result of the improvement of water control by the canal-and-polder networks. Another innovation is an earlier introduction of low-lift pumps with which the perennially reserved water in the canal can be pumped up whenever necessary. The combination of reserved water and pump seems to be the best means to initiate the reform of agricultural practices.³⁾

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